

# **CHINA'S PASTORAL DEVELOPMENT POLICIES AND TIBETAN PLATEAU NOMAD COMMUNITIES**

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## **ABSTRACT**

China's pastoral policies have reshaped traditional pastoralism by creating permanent dwellings, privatizing rangelands, and investing in fences and sheds. Outcomes of these policies include a decline in social capital as awareness of private ownership increases, more severe environmental degradation as stocking rates increase, and a decrease in young livestock mortality. However, the positive impacts are minimal, due to insufficient investment, inappropriate location of fences, and sheds often being used as human shelters. The side effects of new policies obligate policy makers to reconsider. Traditional pastoral practices are nearly always ignored by policy makers, despite their demonstrated sustainability over centuries.

## **KEY WORDS**

China's pastoral policy, Qinghai, Tibetan Plateau, yak

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## INTRODUCTION

Tens of thousands of yaks and sheep were killed in a blizzard in Yushu Tibetan Autonomous Prefecture, Qinghai Province, PR China in 1997. Médecins Sans Frontières (MSF) came to the area to do relief work and hired me. It was then that I began to better understand Tibetan pastoral development issues. This first encounter had a lasting impact on my career.

From 2001-2005, I worked as a program officer for The Bridge Fund (TBF), a Washington D.C.-based NGO, implementing and managing projects in Yushu, where I worked with pastoral specialists Camille Richard and Daniel Miller. I also conducted a pastoral community needs assessment survey and implemented several yak loan programs with my colleagues and local partners. I gradually learned that pastoral development does not simply consist of disaster relief work and poverty alleviation. Policy also plays an essential role in pastoral development programs. Therefore, policy evaluation is of paramount importance to future pastoral development in Tibet. I hypothesized that the causes of contemporary pastoral issues are related to government policy. Consequently, an objective evaluation of China's pastoral policy is highly beneficial to key stakeholders. I hope that this study will be used as a reference by Chinese local governments and NGOs when planning pastoral development programs in Tibetan areas.

## BACKGROUND

The Tibetan Plateau is the world's highest and largest plateau with a size of 2.5 million square kilometers. Three out of five major natural pastures in China are on the Tibetan Plateau (Zhongguo caoyuanwang 2006). Tibetan herders are sparsely scattered across the Tibetan Plateau and have, over millennia, developed traditional livestock and pasture management techniques adapted to the highland environment. They are highly sensitive to environmental changes in pastures, thus their grazing

practices, informed by traditional ecological knowledge, are environmentally sound; time-honored pastoral practices guaranteed sustainable pastures in the past.

In the past half-century, dramatic changes have occurred on the Plateau with socialist collectivization in the 1950s, privatization in the 1980s, sedentarization in the 1990s, and most recently, the policy of herder resettlement in towns. The sedentarization program consists of the division of pasture between households, fencing portions of rangeland, poisoning pikas, and cultivating alien grasses. Pastoral resettlement dramatically shifts traditional pastoralism to a people-centered model.

The Tibetan Plateau environment has been seriously deteriorating in the last decade as a consequence of human behavior and climate change. According to Qinghai xinwen wang (2006), 50-60% of pasture was degraded. The total degraded area of pastureland in TRA<sup>12</sup> was 2.4 million hm<sup>2</sup> in 1996, which is 17% of total grazable grassland in TRA. Compared to the 1950s, per unit fodder decreased 30-50% and undesirable forbs increased 20-30%. Approximately 1.2 million hm<sup>2</sup> is black sand (ibid).

Qinghai's desertified pastures covered 5,970,000 hectares in 1958 and 12,558,001 hectares in 2004. Over forty-six years, 48% of total pasture became desert. Grassland desertification continues at 25,000 hectares a year (Qinghai People's Government 2008).

Pasture degradation in Qinghai has reached a critical level. The desertification and degradation rates have rapidly increased from about 4% in the 1970s and 1980s to 20% in the 1980s and 1990s (Qinghai xinwen wang 2006).

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<sup>12</sup> The Three Rivers Area is located in the northeastern portion of the Tibetan Plateau where the Rma chu (Yellow), 'Bri chu (Yangtze), and Rdza chu (Mekong) rivers originate, hence the name. Rma chen and Khri 'du counties are both located in the TRA.

There appears to be a link between the social and environmental changes that have taken place in Qinghai's grasslands in the twentieth century. Government policy collectivized individual herding units into communal farms in the 1950s, resulting in dense livestock populations herded in small areas, which caused a high animal mortality rate and pasture degradation. In the 1950s and 1960s, approximately 6,700 square kilometers of grassland were cultivated in Qinghai Province and then abandoned due to high altitude and lack of water. The negative side effects of cropland conversion have not yet been ameliorated (Kunchok 2000).

The Qinghai Provincial Government is currently attempting to address problems of pastoral development and grassland degradation with the Four Allocations (FA) policy, whereby each household is provided a house, fencing, storage sheds, and livestock sheds. A precondition of FA implementation is the division of pasture into household units. Each household is then required to acquire the four stipulated allocations, based on their newly divided allotment.

This pastoral settlement policy was implemented beginning in the 1990s in southern Qinghai Province and all pastures there are now divided among individual households. By fencing individual allotments, privatization of the rangeland has limited livestock mobility. Grazing activity range has been greatly reduced adjacent to permanent dwellings. While working with TBF, I found that the financial investment imposed by the FA has burdened certain pastoralist households and placed them in debt. The fenced allotments have also blocked natural grazing paths and some households must travel greater distances to reach water and other pasture resources.

Pastoralists are dissatisfied with the distribution of pasture, pasture quality, and increased variation in water access. This inequity in resource distribution has led to increased conflicts between households and communities. According to one township court judge, such conflicts have led to a breakdown of social cohesion including an increase in unhappiness, stress, jealousy, and anger since land distribution took place.



Limiting grazing space results in inadequate pastoral resource distribution and causes grassland degradation. Lack of resources impacts animal husbandry productivity, leading to income reduction.

## RESEARCH QUESTIONS

In the context of the above, this research addresses the following questions, using a combination of GIS, regression analysis, and quantitative and qualitative research methods:

- How do decollectivization and privatization of rangeland affect Tibetan pastoral communities?
- How does nomad sedentarization influence rangeland degradation?
- How does sedentarization affect animal productivity?
- How does pasture privatization impact social capital?

## LITERATURE REVIEW

An evaluation of Chinese government pastoral development policy in nomad communities on the Tibetan Plateau is essential to regional long-term pastoral development sustainability. There are two distinct views on this matter: the Chinese Government view and the international pastoral specialists' view. The disparity between these two viewpoints will become clear below.

### Cultural Context

The motivations of pasture reform reflect traditional Han Chinese values combined with communist ideology. Williams (2002:61) writes that, "China [is] an agriculture (sic) civilization that conceived of time and space in bounded and discrete increments." Privatization and land allocation are logically deemed to be

preconditions of sedentary civilization. In other words, "The Marx-Lenin-Mao line of political thought held that natural rangeland has no intrinsic values as a resource because it embodies no labor" (ibid:66). A dominant notion of communism is that the direction of human historical development is from primitive to modern and from backwards to advanced; human history gradually improves as it changes from the most backward and primitive societies (hunting and gathering, mobile pastoralism) to sedentary agriculture, and finally to industrial society. In this context, "even marginal farmland was better than natural pasture" (ibid:66). Changing from nomadic pastoralism to sedentary pastoralism is regarded as a benchmark in the history of civilization (Adelihan Yesihan 2004). According to Miller (nd), the Chinese state thought of the area inhabited by Tibetan pastoralists as 'backward', and wanted to change this, ignoring the value of traditional knowledge and practices. The Chinese government sees traditional pastoralism and nomadic lifestyle as wandering and irrational, requiring rationalization and eradication. As a result, the state maximizes pastoral production by increasing livestock numbers without considering environmental protection or sustainability in its understanding of development.

### History of Rangeland Reforms

According to Yan et al. (2005:40), the government assumed that pasture privatization and resettlement provide easier access to the market and "better socio-economic services." These assumptions have propelled attempts to reform pastoralism over the last half century. Since the 1950s, the government's approach to pastoralism was to develop it in line with communist ideology. State-owned collective farms were established and consequently, socialist collective farming dominated Tibetan pastoral development until the 1980s (Miller 1999:17).

Collective communes carried out different means to achieve material prosperity. The government attempted to

provide raw materials demanded by China's economic growth, including maximizing animal product output. Goldstein (1996) argued that the collective commune allowed a 165% increase in livestock after 1952. Consequently, massive pasture degradation occurred due to the artificially increased and maintained stocking levels. However, Goldstein et al. (1990) write that the government has a different view on the cause of pasture degradation, identifying nomads' traditions as the cause of overgrazing and overstocking, and concluded that there is no evidence indicating that traditional pastoral management techniques allow overgrazing or overstocking.

With degradation problems increasingly obvious, the government deemed a new, systematic intervention necessary (ibid). The 'Household Responsibility System'<sup>13</sup> policy was implemented after 1983 and collective communes were dissolved (Miller 1999:17). This system is based on privatization of communal property. However, the definition of privatization employed by the Chinese government is problematic. Chinese Pasture Law,<sup>14</sup> the long-established law governing land ownership, states that all pasture belongs to the state (Qinghaisheng minzhengting 2003). Wu and Richard (1999) claim that rangeland privatization is more like a "long-term leasing system" and does not really privatize the rangeland to individual households (ibid:15). An individual household can use the land by contracting it for fifty years (Richard et al. 2006:84).

An ideally sustainable policy for pastoral development has been sought. Policy has been persistently unstable since the first policy initiatives of the 1950s. Unstable policy and the existing challenges of pastoralism leave space for debate.

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<sup>13</sup> Baochan daohu.

<sup>14</sup> Caoyuanfa.

## Impacts of Decollectivization and Privatization

Pastoral development reform aims to decollectivize and privatize traditional pasture and to settle mobile pastoralists. "[This] unfamiliar and disruptive set of land use practice ... emerged on the grassland of Inner Mongolia" in the early 1980s (Williams 2002:xi). A decade later, this set of rangeland privatization and sedentarization policy was introduced to the Tibetan Plateau. However, the settlement model in Inner Mongolia was shown to have broken down in the early 1980s because "it was too inconvenient to maintain milk cows while living in the residential area" (ibid:95).

The privatization of pasture and nomad settlement policy in Tibetan pastoral areas leads the government to expect optimal outcome. For example, the Qinghai Government deemed that contemporary pastoral development challenges could be overcome through the FA. A document of the Qinghai Provincial Civil Affairs Bureau states:

The establishment of the FA is based on the household as a unit, and entails constructing a house, fencing the pasture, building sheds for hay storage, as well as livestock sheds. The Qinghai Government has established this disaster-prevention system based on previous snowstorm relief experiences, a consideration of the fragile nature of Tibetan alpine pastoralism, precarious productivity, and synthesis of many years of pastoral development experience. Houses, as part of the 'Four Allocations', can improve the living conditions of pastoralists and increase productivity (trans. Qinghai Provincial Civil Affairs Bureau, 2003, chapter 2).

The FA promotes settlement, pasture privatization, allotment of fencing, construction of houses, and cultivation of fodder. The government claimed implementation of this policy would maximize pastoral production and control pasture deterioration (Miller 1999:403).

According to official media the FA has had a tremendous impact on pastoral development. An article from *Pasture Science*, the journal of the Chinese Grass Association, reads:

The results show that the fresh yield was increased by 215 million kilograms. The livestock productive units increased by fifteen million every year, and the stock raising production value, the stock raising income, and the stock raising tax, respectively increased by 138, 176, and 12 million *yuan* every year (Du et al. 2001).

Another general view of settling the herding population holds that resettlement offers better conditions for education (Yan et al. 2005:42). However, parents in pastoral communities are reluctant to send children to boarding schools that are far from their homes, "Child labor is increased on private land, mainly due to the need to guard herds and boundaries" (ibid:42).

Decollectivization of pastoralism is controversial but might be less so if policy implementation was better. Yan et al. (2005) criticize how careless and uneven privatization has been in creating a ratio of people to livestock. Rangeland size for individual households is based on the number of household members and livestock numbers at the time of privatization. The ratio between the numbers of livestock and livestock quantity varies from county to county. However, the initial privatized rangeland division is fixed, while livestock and human populations change over time. Therefore, the fixed allotment does not match the ever-changing ratio between the number of people and livestock (ibid).

An appropriate division into pasture types is essential. Winter and spring pasture comprised less than 30% of total usable rangeland prior to rangeland allocation in Hongyuan County, Rnga ba Tibetan and Qiang Autonomous Prefecture, Sichuan Province (ibid). Rangeland privatization disrupts the seasonal arrangement of pastures. Certain households require an increase in the portion of winter and spring pastures at least 60% greater than current allocations, in order to have adequate

supplies of grass during winter and spring. In homogenous topography, rangeland allocation has less impact on grassland use because all households have the same pasture type. Nevertheless, uneven rangeland distribution is inevitable when the policy extends throughout the county and region under a single standard. For example, Yan et al. (2005) state that 70% of allotted land in Hongyuan is marshland and unsuited for winter grazing.

Many traditional summer and autumn pastures became winter or spring pastures around a year after privatization (ibid:40). Such ignorance of traditional pasture structure quickly resulted in negative consequences. In Hongyuan County, households possessing year-round pastures above 3,800 meters must rent lower pastures every year due to extreme cold and snowfall in winter (ibid).

Lack of flexibility in grazing practices has affected the rangeland horizontally and vertically. According to Lernia (2002), "vertical, seasonal-based transhumance" could save pastures from overgrazing by moving sheep and goats up mountains and keeping cattle in lowlands during the dry season. Yeh (2003:506) shares Lernia's perspective:

The vertical (that is, decreased scope of seasonal transhumance patterns) and horizontal fixing-in-place accomplished by modern state territorially has led to the need for more costly movement for these pastoralists.

Rangeland privatization in Inner Mongolia resulted in similar consequences. Williams (1996:128) notes that, "as enclosures expand, grazing pressures and erosion intensify on the public range, while the poorest residents bear the brunt of ecosystem decline."

Traditionally, "livestock grazing on any one pasture was done temporarily so that vegetation could regenerate" (ibid:131). After privatization, intensified overgrazing has occurred on unfenced pasture and "pastoral people have always needed to move their animals regularly in response to the inevitable spatial and temporal patchiness of grassland resources" (ibid:66).

Salzman (2004:2) claims that mobile pastoralists "actively adapt to their environment, adjusting to its circumstances and manipulating its potentialities." Furthermore, Wu and Richard (2006:7) note that "lack of mobility of the livestock has been identified as a key factor leading to the degradation of rangelands throughout many areas of central Asia" because overgrazing has occurred adjacent to settlements while remote summer pastures have been destocked.

Additionally, Richard et al. (2006) emphasize that nomadic pastoralist settlement has caused erosion and degradation due to a concentration of grazing near riverbanks and settlement houses. As Pirie notes, nomads complain about fenced allotments limiting free grazing. The boundaries between individual allotments "mean possession of land and scope for dispute between neighboring groups" (2005:9).

Rangeland privatization also creates water issues:

[W]ater resources on the Tibetan plateau are unevenly distributed due to topography diversity ... Five to six households used to share one water source, but that is hardly possible after rangeland privatization (Yan et al. 2005:40).

Richard et al. (2006) write that the privatization of rangeland limited water accessibility for many households by fencing individual allotments, resulting in some households traveling further distances to riparian areas. Fencing also led to erosion along riverbanks by increasing the concentration of livestock at water sources. For example, Yan et al. (2005:40) write, "19,300 people and 1.12 million livestock had drinking water problems in Zoige [Mdzod dge] County, in 2000." Salzman's (2004:1) argument about the nature of mobile pastoralism explains why such issues emerged after policy intervention:

The pastoralists try to identify for their particular environment the optimal combination of locale and timing to maximize benefit for the animal—high quality and quantity of pasture, good water, and favorable temperatures—and minimize detrimental influences-

extreme temperatures, lack of water or pasture, exposure to disease, and vulnerability to human or animal predators.

Miller (1999) argues that current policy is based on limited knowledge of the nature of nomadic pastoralism, undermines the values of traditional lifestyles, and is based on a tenuous understanding of the reasons for environmental degradation. Fernández (2000:1318) concurs with Miller's understanding of pastoralists' traditional ecological knowledge, stating that pastoralists are "knowledgeable about their environment and capable of regulating resource" allocation. The value of traditional pastoralist knowledge is summarized by Salzman as follows:

[T]he nomadic strategy is one means by which people adapt to thinly spread resources and to the variability of resources in space and over time. It is also a strategy for avoiding other deleterious environmental conditions, such as extreme heat, cold, and disease (2004:39).

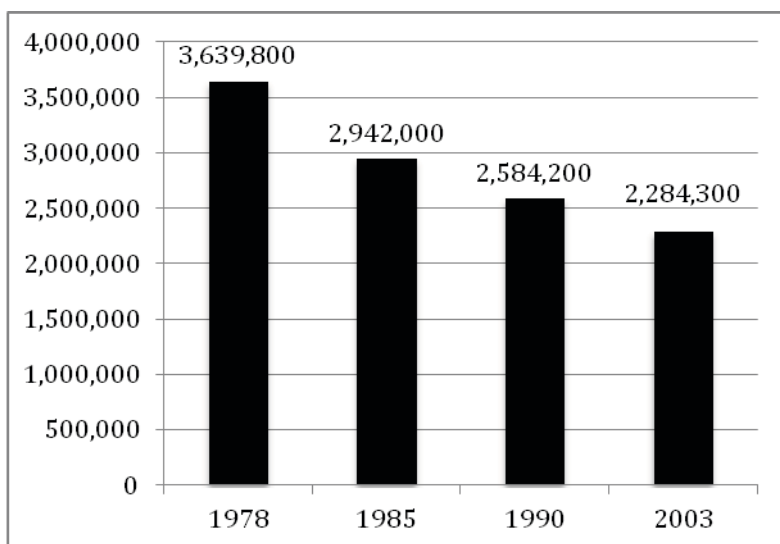
### Degradation

Of the total degraded pasture in the TRA, total pasture yield was reduced 30-50% compared to 1950 (Qinghai xinwen wang 2006). Such poisonous plants as *Stellera chamaejasme*, *Oxytropis ochrocephala*, and *Achnatherum inebrians* have increased 20-30%. Locals believe these poisonous plants harm animals. Furthermore, the speed of degradation has doubled in the upper region of the Rma chu (Yellow River) since 1970 (Qinghai xinwen wang 2006). The medium and severely degraded pasture in the TRA exceeds 10 million hectares of which 4.7 million hectares are 'black sand' (*Zhongguo caoyuan* 2008). The speed of desertification was 3.9% per annum in the 1970s and 1980s and accelerated to 20% in the following decade (Qinghai xinwen wang 2006).



Although the government has introduced several different pastoral policies, rangeland problems persist. The Qinghai Provincial Bureau of Statistics (2004) reported that the number of livestock in Mgo log Tibetan Autonomous Prefecture was 3,639,800 in 1978, 2,942,000 in 1985, 2,584,200 in 1990, and 2,284,300 in 2003 – a reduction of 37.24% from 1978-2003, as shown in the figure below. Pasture degradation has sometimes forced pastoralists to migrate to neighboring areas to seek better pastures to ensure their continued survival. Consequently, conflicts ensue.

Figure 1. Livestock number in Mgo log Tibetan Autonomous Prefecture, 1978-2003 (Xie 2004).



The Revert Pasture to Grassland<sup>15</sup> Policy Committee of Qinghai Province<sup>16</sup> (2004) estimated the rate of rangeland degradation at 2.2% annually since the early 1990s. The total size of the above moderate rangeland degradation in Yushu and Mgo log prefectures is 63.3% of Qinghai's total rangeland. Fodder productivity is 53.2% of that in the 1980s (ibid). The pastoralist

<sup>15</sup> Tuimu huancao

<sup>16</sup> Qinghaisheng tuimu huancao lingdao xiaozu bangongshi

sedentarization program and an increase in conflicts have overlapped during the same time period.

### Rangeland Conflicts

Grassland conflict now ranks as a secondary problem in the list of social problems in China's pastoral areas. The primary problem is pasture degradation. The government ignores grassland conflict as it strives to address degradation problems. The number of annual grassland conflict cases rose from 784 in 2004, to 2,579 in 2005, a 245% increase in a single year (Nongyebu 2006). The Agriculture Department's report states that pastoralists' awareness of ownership of specific rangelands and inadequate law enforcement are factors responsible for the increasing number of conflicts (*ibid*). Local governments on both sides of conflict areas prejudicially stand by their own administrative areas (*ibid*). As a result, grassland conflicts are prolonged and recurrent.

Yan et al. (2005:42) note, "fencing causes conflicts over routes for mobile grazing." Fencing creates no routes or very narrow routes for seasonal livestock migration, therefore moving livestock is challenging. Yeh (2003) has argued for a new perspective on rangeland privatization, based on Richard's critical observation of 'allotment'. Pasture privatization divides land into small pieces and limits flexibility in grazing practices. Unfair rangeland allocations lead to increased violence over distribution among households and villages. Yeh's consultants emphasized that rangeland privatization undermined their sense of solidarity (*ibid*).

"Historically, grassland in [northeast Tibet] was held as common property" and "[this] greater flexibility in pasture allocation adjustments" kept residents away from inter-household grassland conflicts" (*ibid*:511-512). "[The] use rights privatization and especially fencing have precipitated new conflicts by increasing inequality of access to pasture and decreasing flexibility" (*ibid*:512). This contrasts sharply with the time when pastoralists lived and moved together, prior to

privatization. "[L]iving and moving together provided effective security when people were in groups and helped each other" (Yan et al. 2005).

Yeh (2003:5) contends that privatization of rangeland into small allotments induces conflict at the household, community, and a large range of district levels. She found that household-level conflict was rarely seen prior to the Liberation (ibid).

To understand conflict prior to pastoral reform, we must first understand local social structure and history (Yeh 2003:511):

Although territory in pre-PRC Amdo<sup>17</sup> was not conceived of as abstract mapped space, there was a well-developed sense of territorial rights embodied in *tsowa*<sup>18</sup> membership.

Historically, inter-household conflicts within *tsowa* were uncommon. Reasons for this include greater flexibility in pasture allocation adjustments (ibid).

Grassland conflicts in Tibetan areas include community-level conflict, which is on a larger scale rather than household-level conflict (Yeh 2003). Although rangeland conflict is an historical fact, many conflicts were at the community level. Proliferation of household-level grassland conflicts is recent (ibid). The literature and empirical information suggest that privatization causes increased grassland conflict at the household level. For example, a deadly conflict occurred between bordering pastoral communities in Rma chu and Henan<sup>19</sup> counties from 1997-1999, beginning just after the government drew the official pasture border. This conflict killed at least twenty-nine people (Yeh 2003). Rangeland privatization intensifies conflicts between

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<sup>17</sup> A mdo is the northeast part of the Tibetan Plateau.

<sup>18</sup> *Tsowa/ Tsho ba* = tribe.

<sup>19</sup> Henan Mongolian Autonomous County is one of four counties in Rma lho Tibetan Autonomous Prefecture, Qinghai Province. Rma chu is part of Kan lho Tibetan Autonomous Prefecture, Gansu Province.

communities and creates small-scale conflicts, which were uncommon prior to privatization.

The literature shows that conflicts are related to government policy, but we still need to understand how policy creates such conflict.

## EVIDENCE AND ANALYSIS

### Grassland Conflicts

Information on grassland conflicts is sensitive and confidential, and my attempt to collect such data did not go as expected. Furthermore, there is a lack of documentation detailing the precise extent of localized grassland divisions. This is, it turned out, a source of conflict in itself.

Land division is an enormous task. Accurately and rapidly measuring massive land areas and drawing boundaries between households is almost impossible. Local officers undertaking this work are not specialists in land redistribution; they are bureaucrats implementing an assigned task. As a result, rangeland boundaries are poorly defined and people lack documentation to legitimize rangeland privatization – a cause of social unrest (Zhang 2003). Unclear rangeland boundaries and ambiguous rangeland ownership are the foundations of conflict (Yangduo Caidan 2001). Rangeland conflict over grassland has accelerated since privatization took place.

Peace between conflicting parties has been fragile. Local people have the expression, "The more agreements you sign, the more conflicts you have." For example, when parties sign a second agreement on the same conflict area, the first loses its effectiveness as an agreement (Yangduo Caidan 2001).

In addition to the problems of documentation, the uneven distribution of resources may lead to conflicts, as outlined in the following two case studies.

*Case Study 1 – Conflict Avoidance Through Recollectivization.*

All pastures in southern Qinghai Province have been allocated to individual households based on the ratio of 70% human and 30% animal population, the most common ratio used to divide rangeland in Tibetan pastoral areas. Local officials who were interviewed said that pasture privatization began in Khri 'du County, Yushu Tibetan Autonomous Prefecture in the early 1990s. Government tax is calculated per head of livestock and local households therefore commonly provide a false livestock number to the government tax registration office so as to pay less tax. Since the privatized and fixed allotments of rangeland cannot support the actual number of livestock in many households, inter-allotments of grazing land occur. An accumulation of inter-allotments of grazing land causes conflicts among neighbors.

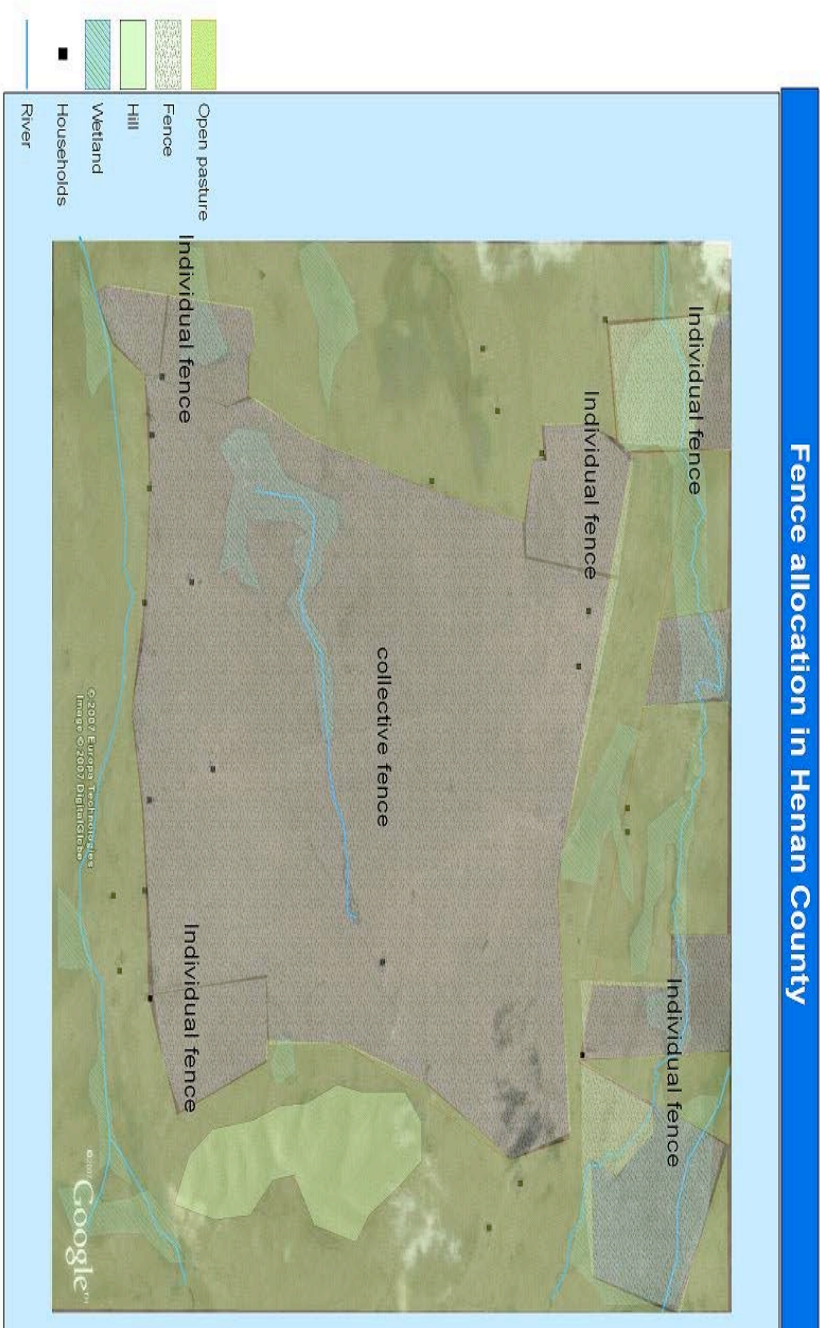
Faced with daily conflicts, collective herding groups have spontaneously formed among neighbors in Skar chen<sup>20</sup> APC, contrary to privatization policy. Rangeland conflicts have noticeably declined among these collective herding groups.

Spontaneous collective herding has also occurred in other pastoral areas in Qinghai Province since privatization. Collective herding mitigates the risk of social unrest and environmental degradation. Figure 2 shows a hypothetical model of collective versus household pasture allotment, and is based on a Google satellite image of Henan Mongolian Autonomous County. If this collective fenced area were divided into household allotments, certain households would lack access to water, which is only available on either side and at the middle of the collective fenced area. This hypothetical assumption was a reality in Skar chen APC immediately after privatization. In Skar chen, as in the hypothetical case below, water availability was the primary motivation for regrouping; distributing uneven resources compels households to reconsider the privatization policy.

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<sup>20</sup> I conducted a needs assessment survey in Skar chen APC, Sdom mda' Township, Khri 'du County, Yushu Tibetan Autonomous Prefecture in 2005.

Figure 2. Hypothetical fence allocation in Henan Mongolian Autonomous County.



Most households are concentrated along the southern side of the fence, causing overgrazing from herding adjacent to the settlements. The effect of overgrazing can also be seen by examining the distribution of wetlands near the riverbanks. There are abundant wetlands on the northern riverbanks where there are fewer settlements. Wetlands are few near the southern riverbanks. This phenomenon corresponds with the arguments of Richard et al. (2006), Pirie (2005), and Yan et al. (2005), who argue that fencing and privatization lead to erosion along riverbanks by concentrating livestock at water sources.

*Case Study 2 – Conflict Over Unevenly Distributed Pastoral Resources.* Privatization and land division result in an imbalance in resource distribution across topographical variations. In particular, the placement of settlements and land division within variable topography significantly impacts grazing adaptability (Kuhn 2006:26):

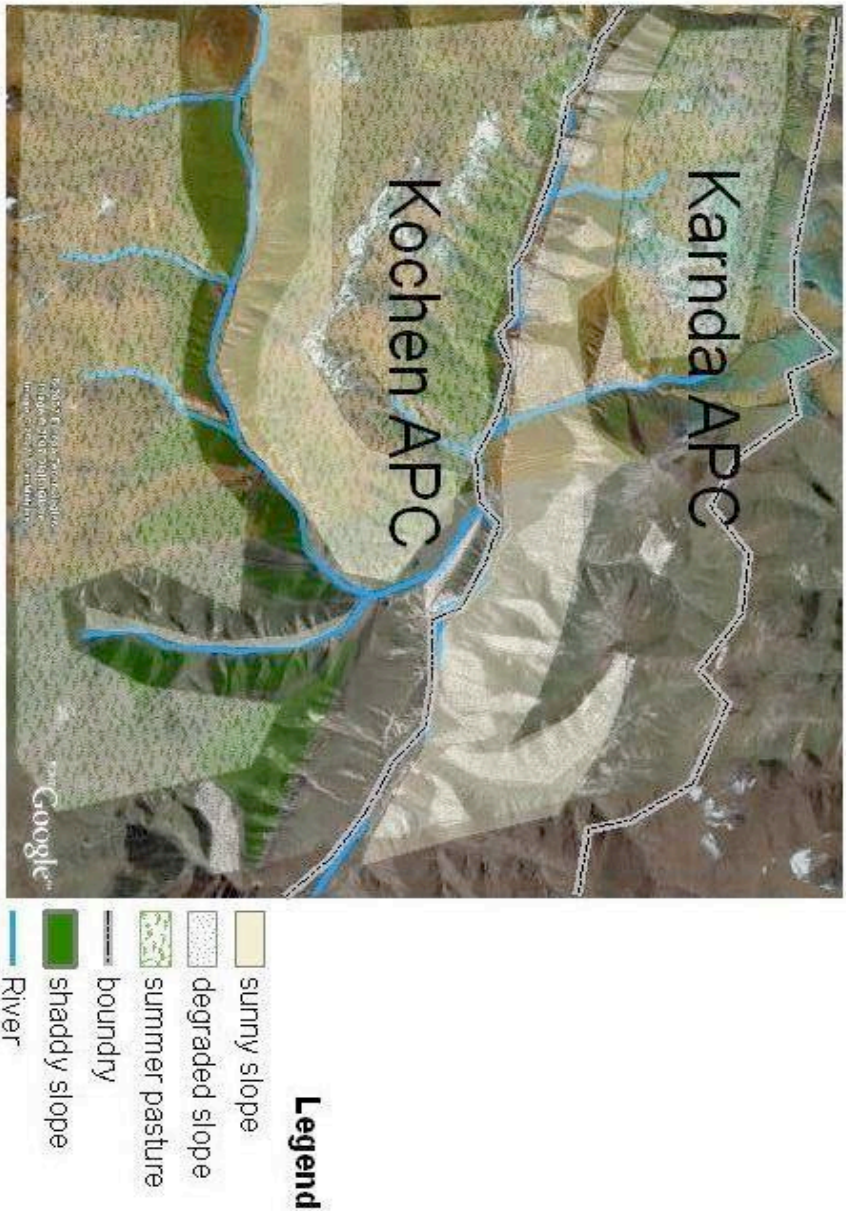
Mobility and herd diversity traditionally have been nomads' keys to surviving these conditions by evenly allocating animals to grasslands and taking advantage of local variations in climate and vegetation.

Kuhn's argument may be applied to the Ko chen and Skar mda' case. Traditionally, Ko chen and Skar mda' APCs were a single community, which the government divided into two separate entities in the 1960s. Ko chen has topographically diverse pasture, which Skar mda' lacks. Skar mda' is located on the northern side of an east-west running valley. Slopes in Skar mda' face south. Ko chen occupies half of the southern valley where slopes face north. A more variable range of slope aspects exist, with numerous north-south running tributary valleys.

South-facing slopes receive higher solar radiation in winter, as opposed to north-facing slopes, which are mostly shady and unsuited for grazing during the snowy season, as snow stays longer on these slopes, covering fodder. Moisture on shady

slopes evaporates slowly; the moisture held by the soil nurtures seeds and seedlings, and these slopes have denser vegetation than sunny slopes. This can be seen from the satellite map in Figure 3.

Figure 3. Land distribution in Skar mda' (Karnda) and Ko chen (Kochen) APCs.





However, Skar mda' APC residents have little choice regarding seasonal pastures. Much Skar mda' territory is located on sunny, south-facing slopes. Vegetation is scarce because snow melts faster on these slopes and soil retains less moisture. Skar mda' APC lacks seasonal pastures, concentrating grazing only on sunny slopes that are becoming increasingly degraded as evident from the satellite images in Figure 3.

Pastures on Ko chen's sunny slopes can rest in summer to allow vegetation to recover, because Ko chen has a diverse choice of pasture. Therefore, sunny slopes are not as degraded as in Skar mda'.

Skar mda' residents face a chronic fodder shortage due to the growing number of livestock, and asked the government to return their pastures from Ko chen, but this has been ignored. Skar mda' livestock occasionally graze in Ko chen territory. In an interview, a Ko chen herder complained about an intrusion from Skar mda'. Arguments have intensified between members of the two communities, who often accuse each other of being the offender.

This artificial land division has led to environmental degradation and a decline in social cohesion. An example of the decline in social capital is explained below. Some parents in Ko chen APC do not send their children to Skar mda' Primary School, regardless of the high quality of the school and the short distance, because of conflicts between the two communities. Many school-age children in Ko chen therefore do not attend school, while others attend school in the distant township town if they have relatives there to care of them.

In the context of a needs assessment in Skar mda', a community brainstorming session was held in 2004 to prioritize local needs, finding that the first priority was to return or share their former pasture with Ko chen. This indicates that land division caused the most significant problem in the community.

Lack of mobility between sunny and shady slopes exacerbates livestock mortality during snowstorms and other bad weather. Pastoralists previously moved freely from shady to sunny slopes to avoid snowstorms, which reduced livestock

mortality. Such mobility is now impossible. There are no mechanisms under the current policy to readjust pastoral resource management. Before the new policy, herders had more options when they were confronted with such crises as nascent conflict and snowstorms.

Ko chen APC leaders strongly preferred collective herding, saying that it avoided inter-household conflict. All household members in this collective group have equal access to the same common pasture, water resources, and seasonal pastures. For these reasons, collective herding eliminates the basis of inter-household conflicts because such conflict is rare when people graze their livestock on common pasture.

According to interviewees in Ko chen, advantages of the collective herding model include community leaders and experienced senior pastoralists' ability to effectively lead group herding for the entire community's benefit. The efforts of community leaders and experienced herders have an equal effect on all households within the group; they are not confined to individual families. Also, it allows regulations to be applied more easily to collective herding. For example, seasonal pasture movements can be arranged according to a schedule that experienced herders and community leaders can easily monitor and guide.

Conversely, inexperienced herders suffer in completely privatized rangeland. In the absence of mandatory commitment to their pastoral practice, poor management skills create poverty. Also, people who obtained inferior land during the privatization processes lack incentives to invest in the pasture.

### Sheds

The FA provides a house, fenced pasture of 16.67 hectares, a shed of sixty square meters, and 0.33 hectares of land for growing fodder per household. In the early 1990s, the Qinghai Provincial Government targeted 37,451 households in southern

Qinghai for the implementation of FA within ten years (Zhang et al. 2005).

As a program component, the shed significantly impacts herders' livelihood by protecting livestock from winter cold. The data below (Figure 4) shows temperature changes inside and outside a shed in various locations over several days.

The average temperature in the shed over twenty-four hours was  $-6.50^{\circ}\text{C}$ , whereas outside the shed it was  $-13.50^{\circ}\text{C}$ , a difference of  $7^{\circ}\text{C}$ . The temperature changes reduce animal weight loss that usually occurs during cold weather due to burning fat to stay warm.

An evaluation report for Mgo log Prefecture showed that the average weight of sheep kept within a shed decreased by 4.06 kilograms from December-April. In comparison, the weight of sheep lacking access to a shed decreased by 10.58 kilograms over the same time period. The difference in weight loss was 6.52 kilograms per sheep (see Figure 5).

Figure 4. Temperature changes outside and inside a shed (Zhang et al. 2005).

Date	Site	Days	Average Temp in Shed	Average Outside Temp	Dif
November 1997	Rdza stod	5.0	-6.58	-12.34	5.76
December 1998	Dar lag	10.0	-7.27	-13.26	5.99
January 1999	Rma stod	8.0	-5.66	-14.90	9.24
Average		7.6	-6.50	-13.50	7.00

Figure 5. The impact of sheds on livestock weight (kg) (Zhang et al. 2005).

Time	Count	#	With Shed			#	Without Shed		
			Start	End	Dif		Start	End	Dif
12/96~04/97	Dga'y bde	3	42.8	38.0	4.7	3	40.7	30.9	9.82
12/97~04/98	Dari	3	41.8	38.1	3.6	5	39.3	28.6	10.7
12/98~04/99	Rma chen	3	42.1	38.3	3.7	3	46.0	34.8	11.2
		0	4	6	6	0	5	4	1

Sheds reduced animal mortality rates, particularly among lambs during the birthing season from December to April, and extremely cold time of year. The majority of lambs are delivered in January and February, the coldest months. Without human intervention, lambs often freeze to death at night, leading herders to frequently check their flocks at night. Herders with sheds, however, do not need to keep watch at night and lamb survival rates dramatically increase (see Figure 6).

Figure 6. The impact of sheds on lamb survival rate (Zhang et al. 2005).

Year	#HH	With Shed			#HH	No Shed			Compared
		B	O	L		B	O	L	O
		S	S	S		S	S	S	S
		N	R	R		N	R	R	R
				%			%	%	%
1995	12	948	3.27	86.59	8	392	7.4	69.51	55.81
1996	12	1,086	3.31	92.60	8	386	15.28	61.90	78.34
1997	12	1,258	0.95	88.44	8	379	6.07	85.62	84.35
1998	12	1,349	1.04	88.39	8	386	7.51	81.34	86.15
#HH = Number of Households; BSN = Baseline Number; OSR = Overall Survival Rate; LSR = Lamb Survival Rate									

Shed are also put to unexpected uses. That certain herders have chosen to live in sheds is easily observed when traveling in Tibetan areas. Herders explained that sheds are warmer, bigger, and brighter than a tent or house. Though sheds did not serve the initial purpose of the program, they nonetheless benefit herders.

Although sheds have many advantages, certain issues must be considered. An interviewee said that although they provide better protection, the ventilation in the shed is poor when there is crowding in and sheep easily get lung diseases. Lambs and yak calves raised inside sheds are also less healthy than those raised outside sheds.

### Fencing

Fencing excludes livestock and prevents grazing of pasture at certain times. Certain pastures are fenced to conserve fodder for late winter and early spring, when it is most scarce. Fencing also helps vegetation recover in summer. Vegetation in fenced areas

provides emergency fodder when medium level snowstorms occur and helps increase livestock survival rates in such an event. Fodder from fenced pastures can also be fed to weak and sick animals during food scarcities beginning in December when much of the old grass has been eaten and new grass has not yet grown. This reduces mortality, as seen in Figure 7 below.

Figure 7. Measurement of fencing impact (Du 2006:50).

Year	Grass Yield Inside Fence	Grass Yield Outside Fence	Increase	Increase %
2004	1,082.00	976.50	105.50	10.80
2005	1,278.00	1,110.00	168.00	15.10

Fencing has a clear, positive impact on vegetation in density, height, and quantity. Yushu County Grass Station measured the yield of a fenced area in Dpal thang Township from 2004-2005 and found fodder yield inside the fenced area increased from 10.80-15.10%. Fencing not only increases fodder yield, but also allows faster and more complete recovery of vegetation. Rehabilitation of deteriorating pasture by fencing has a significant impact on the long-term sustainability of pasture. Fences prevent disturbances, allowing grass to seed and give pastures a greater chance of recovery. Without fencing, grass has no chance to seed due to continued grazing.

Though local herders expressed appreciation for fencing, many could not afford it. There were government loans for fencing, but the borrowers later failed to pay back loans due to inadequate pasture production and interest accumulation. Smaller areas are cheaper to fence, but their impact is also smaller. An interviewee in Skar chen said that the size of the fenced area impacts productivity. For example, a small patch of fenced pasture increased fodder productivity, but did not improve overall household livestock productivity because of the limited output of the small fenced area.

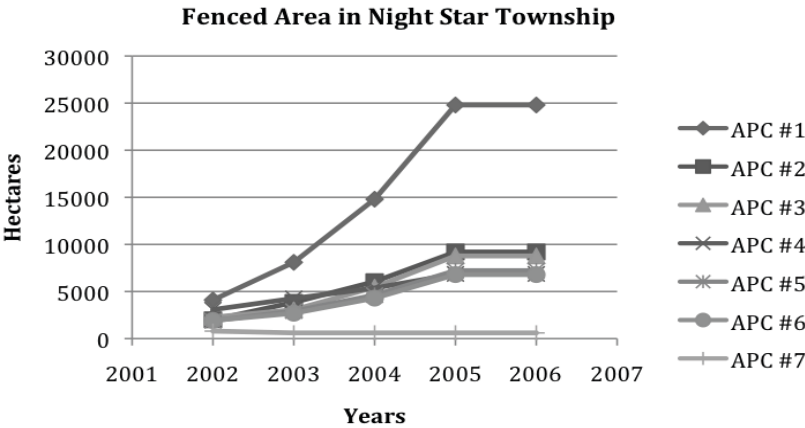
Night Star Township implemented the privatization and FA policy beginning in 1993. According to new policy goals,

program input and animal productivity output should be positively correlated with fences and sheds improving animal husbandry outcomes, which is one of my hypotheses. Since I lacked baseline data for animal productivity prior to the new policy, time-series analysis is inappropriate to analyze the policy's impact.

Fortunately, level of implementation varies from one APC to another in Night Star Township, which allows for comparison. For example, APC #7 had just begun to implement the fence and shed program in 2006 and thus, APC #7 can be used as a control variable in investigating the effect of fencing on animal productivity. The comparative figures of animal productivity over time are based on NSTG data.

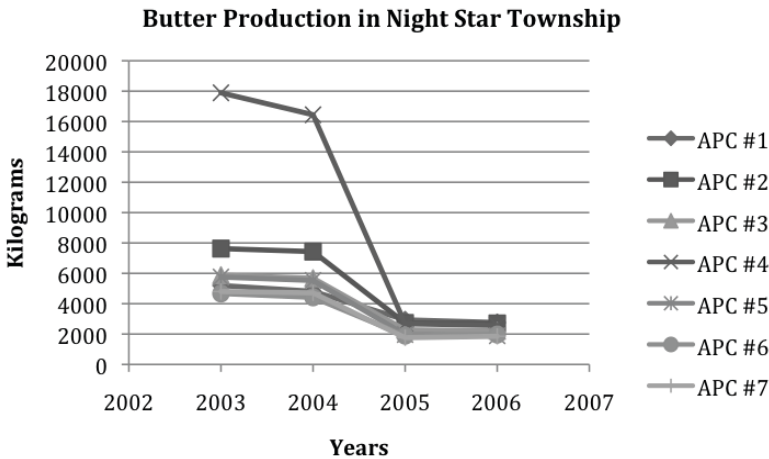
Before 2002, no APCs in Night Star Township had more than 4,100 hectares of fenced pasture. Since 2002, the area of fenced pasture increased annually in all APCs, except APC #7. APC #1, in particular, dramatically increased the area of fenced pasture. The total area of fenced pasture almost equals the combined fenced area of all other APCs in Night Star as can be seen in Figure 8.

Figure 8. Fenced area in Night Star Township, 2001-2007.



According to the fence evaluation report by Yushu County Grass Station (Du 2006) and the goals of the FA as described above, we assume that animal productivity increases as fenced pasture increases. To measure the correlation between amount of fenced pasture and animal productivity, butter productivity (kg/ year) was used to measure animal productivity. The amount of kilograms of butter produced annually is commonly accepted as a measure of animal productivity. The amount of butter should increase as the fenced area expands. If the fence serves its purpose, APC #1 should have the highest butter production and APC #7 should have the lowest. However, the butter production of APC #1 and APC #7 are almost identical, as shown in Figure 9.

Figure 9. Butter production in Night Star Township, 2002-2007.



Fencing did not affect butter production, which was stable from 2002-2004 in all APCs and then dropped from 2004-2006. Fencing increased from 2002-2006 as shown in Figure 8. There was no correlation between fenced area and butter production. Butter production of APC #7 is no different from other APCs. The butter production trends of APC #1 and APC #7 are almost identical, despite these two APCs having very different amounts of fenced area.



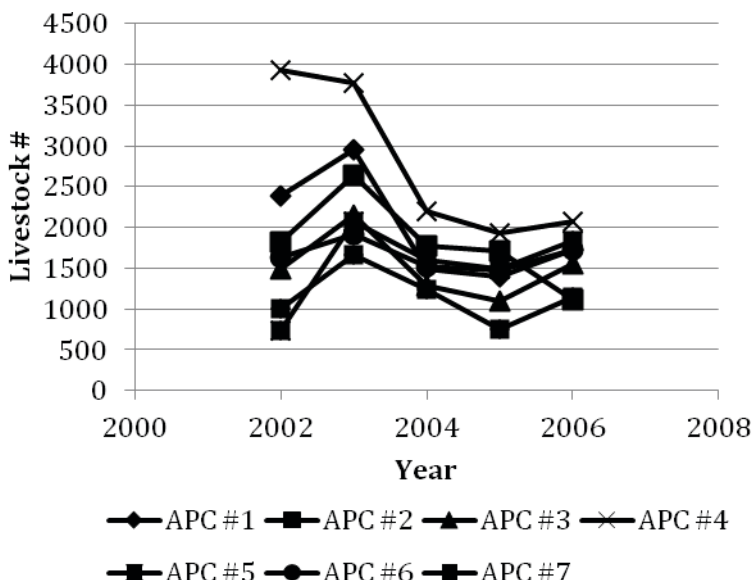
However, this evidence does not rule out a correlation between animal productivity and fenced area. Transportation has improved and households may have sold fresh milk and yogurt instead of producing butter.<sup>21</sup>

Livestock number may be a better way of measuring the effect of fenced area size on animal productivity. Despite government attempts to control the animal population to maintain equilibrium between pasture carrying capacity and animal population, livestock population trends can be used to explain the effect of fenced area size. The reason for this is that the sharp fluctuation of livestock populations may signal fence dysfunction. Historically, sharp fluctuations occurred when there were snowstorms or droughts. Fences supposedly mitigate livestock loss during natural disasters. However, sharp fluctuations in livestock population in all APCs have occurred equally since implementation of FA in 2002. Particularly, APC #7 and APC #1 should be noted, as can be seen in Figure 10, because these two APCs display similar livestock trends despite one having the largest area of fenced land in the township and the other having the least.

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<sup>21</sup> Motorcycles became increasingly common in many Tibetan herding areas beginning in the 1990s.

Figure 10. Livestock reproduction in Night Star Township, 2001-2007.

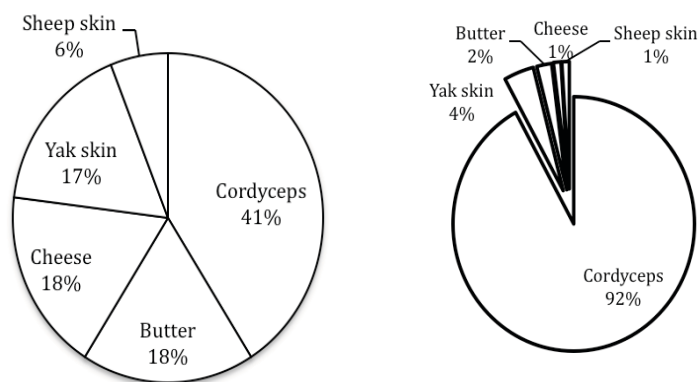


Despite the livestock reduction noted in the figure above, pastoralists' living conditions have improved in recent years. Net incomes of all APCs grew steadily since 2002. Is this the effect of pastoral policy? Is it the consequence of government promoting the commercialization of animal husbandry? These questions may be answered by examining the annual product data of Night Star Township and market prices. The income from butter, cheese, sheep skins, yak skins, and *Ophiocordyceps sinensis*<sup>22</sup> can be multiplied by the market prices of that year to obtain a measure of income. I found that the major portion of locals' income is not from animal husbandry, but from *Ophiocordyceps sinensis*. The prices of animal products had not changed significantly since 2002. However, the price of

<sup>22</sup> *Ophiocordyceps sinensis* (caterpillar fungus) is a traditional medicine widely used as a tonic and medicine by Chinese for centuries. It is found on the Tibetan Plateau, Bhutan, and northern Nepal.

*Ophiocordyceps sinensis* dramatically increased each year. In 2002, income from *Ophiocordyceps sinensis* sales constituted 41% of Night Star's total income and, by 2006, comprised 92% of total income as shown in figures 11 and 12. This indicates that the growing net income is not attributable to pastoral reform. The booming *Ophiocordyceps sinensis* economy overshadows traditional pastoral economic issues because people no longer depend solely on livestock. Therefore, pastoral issues became covert, potential problems. Once the economic bubble currently created by the booming *Ophiocordyceps sinensis* market bursts, pastoral development issues will become critical.

Figure 11. Night Star Township sector income, 2002 vs 2006.



According to an interviewee, the expense of fencing is such that only a limited amount is affordable. Insufficient fencing was ineffective in preserving pasture and livestock during the severe snowstorms of 1997.

Fence location is of paramount importance – incorrectly placed fencing wastes resources. I observed almost no difference in pasture quality between the inside and outside of fenced areas in arid areas. Fencing arid pastures is not recommended. However, fencing along riverbanks in wetlands and on non-arid pastures provides good results.

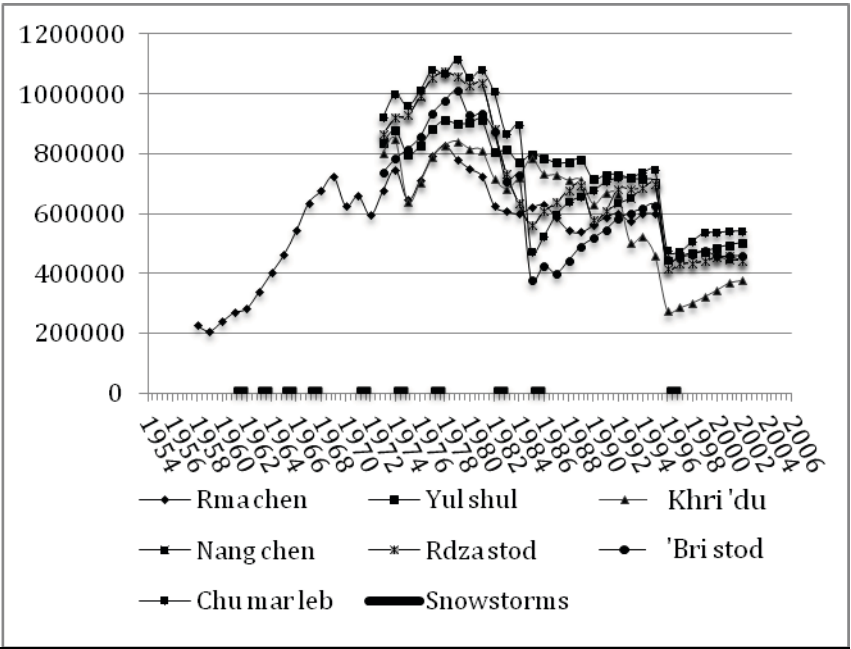
Fences are more effective if households open fenced areas to weaker animals instead of grazing all their livestock there. The

limited fodder inside fenced areas is insufficient for all livestock but is sufficient for a few weak animals. Consequently, herders should classify livestock according to physical condition and give priority to weaker animals for foraging in fenced areas during winter and spring, thus maximizing fencing's effect.

### Pasture Degradation

High stocking rates occurred after, "the dismantling of the traditional pastoral management system in 1952 by the new Chinese government, and by its policy of calling for increased animal husbandry production" (Goldstein 1996:2).

Figure 12. Livestock fluctuation from 1967-1978 in six counties in Yushu and Rma chen County in Mgo log.



Livestock number in Rma chen County tripled from 1958 to 1968, which is attributed to a policy calling for increasing animal production in the 1950s. An over 300% increase in

grazing population overburdened the grazing carrying capacity. Figure 12 suggests that snowstorms from 1958 to 1968 were accompanied by a sharp increase in livestock population. One explanation is that rangeland that had never before been overgrazed had a substantial livestock carrying capacity until overgrazing gradually led to degradation. Comparatively, Rma chen County in 1968 had three times more livestock than in 1958. Therefore, inadequate forage for livestock during snowstorms likely causes greater animal mortality than when there are more forage resources.

An examination of Nori (2004) and Goldstein's (1996) data reveals a relationship between overstocking and losses in snowstorms in southern Qinghai. Increasing livestock number above 600,000 resulted in a drastic drop in livestock number. For example, when the total number of livestock reached 723,935 in 1969, the following year, 98,783 livestock were lost (ibid). "The total number of livestock was actually 5.7% lower than the 1967" (ibid).

Livestock number kept near the equilibrium point until 2007 resulted in maximization of profitability working for long-term sustainability. If livestock number is kept at equilibrium, animal productivity is stable. In this case, the hypothesis that overgrazing causes degradation is somewhat challenged, since degraded rangeland cannot sustain the maximum number of livestock for decades. Rangeland degradation is a great challenge in western China. According to an unnamed government agency's investigation, 50-60% of pasture around the TRA is degraded to some extent (Qinghai xinwen wang 2006). How can degraded rangeland keep livestock numbers at equilibrium? To answer this question, we must obtain data from after 1995. Degradation is a long, slow process; its impact cannot be seen within a short time. However, we lack data about Rma chen County after 1995 and thus must apply data from neighboring counties.

Yushu's six counties share similar climate, policy, geography, and history to Rma chen. Therefore, we can treat Rma chen County as a control variable for the study of pastoral development in Yushu. Data are available from all counties for the period 1973-1995. The livestock trend and effects of snowstorms were comparable within this period. Khri 'du County is geographically close to Rma chen County and the trends in

these two counties are similar. Rma chen data imply knowable data prior to 1973 in other counties (Figure 12). Therefore, all counties were treated as a single unit of analysis.

From 1972-1991, Khri 'du County's livestock number was kept at an equilibrium point of around 700,000. Each time the livestock number exceeded the equilibrium, a sharp drop was observed the next year. After 1995, the livestock population dropped and never reached the previous equilibrium level again. This phenomenon demonstrates that a certain period of overgrazing leads to long-term degradation.

When plotted, livestock population changes over the last five decades resemble the Kuznets curve, which hypothesizes a relationship between economic development and environmental quality. In this case, increasing animal production seems to lead to an increase in environmental degradation, i.e., long-term overgrazing causes environmental degradation.

### Effects of Natural Disaster after Overstocking

Major fluctuations in livestock populations imply the occurrence of interventions and disturbances in the past three decades. There were sharp drops in livestock numbers in 1974-1975, 1983-1985, and 1995-1996. Each drop was caused by snowstorms. Ten major snowstorms struck southern Qinghai Province between 1954 and 1985, in 1954, 1956, 1961, 1963, 1965, 1967, 1971, 1974, 1977, 1982, and 1985 (Guoluo Prefecture Government 2008). However, the snowstorms did not affect the increase in livestock population before 1965. Snowstorms began to affect livestock number when livestock raising reached maximum profitability after the 1970s.

Blizzards occurred in 1983, 1985, 1989, 1995, and 1996 (Shi et al. 2001, 50). Blizzards in 1985 and 1995 were the deadliest in recent history and caused a dramatic reduction in livestock numbers, which then gradually rebounded. However, recovery from the most recent blizzards has been minimal and stocking levels have not reached levels prior to each disaster. Overall, the livestock figures have consistently decreased since early 1973.

## CONCLUSIONS AND RECOMMENDATIONS

Decollectivization and privatization of Tibetan pastoral rangelands was attempted in order to improve pastoralists' economic conditions. In practice, related policy has been complex, impractical, and non-participatory. The government takes the view that the FA enhances economic growth by moving herders into new, government-built houses. Afterwards, however, these pastoralists lose the traditional form of life they have practiced for millennia.

Applying GIS and quantitative and qualitative data research methods to case studies, it can be seen that:

- Privatization has caused social unrest and conflicts between neighbors. Some pastoralists formed collective grazing areas to address conflict issues.
- Sedentarizing herders increases rangeland degradation and erosion of riparian areas by limiting livestock grazing mobility. Fences mitigate the negative impacts of environmental degradation but sufficient funds are needed for building and maintaining fencing.
- The maximization of profitability by overstocking led to a process of depletion of pastoral resources. Profit-oriented equilibrium between the resource and stock rate cannot be sustained over the long term.
- Pastoralism has become less significant to pastoralists' livelihood as *Ophiocordyceps sinensis* has increasingly become the most important source of income, at least in the study area of Night Star Township. This increase in pastoralist income offsets the decline in animal husbandry productivity.

Current policy designed to put people first must be rethought. The quality of implementation of pastoral policy must be improved. Poor documentation and ambiguous boundaries contribute to rangeland conflict. Explicit documentation of rangeland boundaries would reduce rangeland conflicts.

Meaningful designation of fencing placement is important; fences should be placed in consultation with knowledgeable local stakeholders. My analysis suggests that the result of fencing is positive in the short-run but it must not be permanent; rather, after a certain number of years, fences should be moved to a new area. Large fenced areas have greater impact than a number of small fenced areas.

Current fencing loans are a heavy burden for nomads. Some families are deep in debt because they are required to fence. Debt reduction policy is recommended.

This research suggests sedentarizing Tibetan herders is not a realistic solution to poverty alleviation. They cannot adapt to new circumstances and lack job skills leading to even worse poverty.

I conclude that government policy does not meet its objectives, and wastes a great deal of government resources. Policy makers need to objectively evaluate previous policies and be open to accept suggestions and findings from independent experts. The government must particularly listen to the key stakeholders – the pastoralists – who directly experience policy impact and who have an intimate, profound, generationally transmitted knowledge of pastoralism.